Cheng Zhang

Curriculum vitae

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chantisnake
Full CV

Education

2018 — Now **Computer Science, Doctor of Philosophy**, Boston University, Boston, MA

Primary Interest: Algebra Method in Program Analysis

I am also interested in program logic, automated reasoning, and program semantics.

2014 — 2018 **Mathematics, Bachelor of Art**, *with department honor, magna cum laude*, Wheaton College, Norton, MA

Honor Thesis: King in Generalized Tournaments.

Minors: Computer Science, Economics.

2016 — 2017 **Economics, Study Aboard**, London School Of Economics, London, United Kingdom

Publications And Preprints

2022 **Mark Lemay, Qiancheng Fu, Cheng Zhang, William Blair, Hongwei Xi**, *Gradual Correctness: a Dependently Typed Language with Dynamic Equality*, Submitted to CPP 2022

2022 **Cheng Zhang, Arthur Azevedo de Amorim, Marco Gaboardi**, *On Incorrectness Logic and Kleene Algebra With Top and Tests*, Principle Of Programming Language

2020 **Mark Lemay, Cheng Zhang, William Blair**, *Developing a Dependently Typed Language with Runtime Proof Search (Extended Abstract)*, Workshop on Type-Driven Development

2018 **Cheng Zhang**, *King in Generalized Tournaments*, Wheaton College Honor Thesis

2018 **Cheng Zhang, Weiqi Feng, Emma Steffens, Alvaro de Landaluce, Scott Kleinman, Mark D. LeBlanc**, *Lexos 2017: Building Reliable Software in Python*, Conference for Computing in Small Colleges, UNH-Manchester

Talks

2018 **Cheng Zhang, Mark D. LeBlanc**, *Lexos 2017: Building Reliable Software in Python*, Conference for Computing in Small Colleges, UNH-Manchester

2018 **Cheng Zhang**, *Kings in Quasi-transitive Oriented Graph*, Wheaton Summit For Woman In STEM

Research Projects

2021 — Now **Probabilistic Kleene Algebra**, *Boston University Department of Computer Science*, Boston, MA

Examine the mathematical foundation of probabilistic Kleene Algebra and its potential application in analysis of probabilistic programs.

2020 — Now **Algebraic Formulation Of Incorrectness Logic**, *Boston University Department of Computer Science*, Boston, MA

Investigates the support that KAT provides for reasoning about *incorrectness*, as embodied by Ohearn's recently proposed incorrectness logic. We show that KAT cannot directly express incorrectness logic. To address this issue, we study Kleene algebra with Top and Tests (TopKAT), an extension of KAT with a top element. We show that TopKAT is powerful enough to express a codomain operation, to express incorrectness triples, and to prove all the rules of incorrectness logic sound. This shows that one can reason about the incorrectness of while-like programs by means of the equational theory of TopKAT.

2017 — 2018 **Mathematics Honor Thesis**, *Wheaton College Mathematics Department*, Norton, MA

Studied kings in generalizations of tournament, with a special focus on quasi-transitive oriented graphs. I have shown that all the quasi-transitive oriented graphs can be condensed into a tournament via tie component condensation, and tie component condensation of quasi-transitive oriented graphs is the most efficient condensation to tournament.

2015 — 2018 **Software Lead**, *Lexomics Research Group, Wheaton College*, Norton, MA

Led a major factorization of the text analysis software Lexos. In the process, I implemented modern software development workflows and transitioned the code base to a functional-first paradigm for ease of maintenance. I have also proposed a new architecture for side-effect management in Python.

Honors And Fellowships

2018 — Now A member of Phi Beta Kappa.

2018 Boston University Dean's Fellowship

2018 Phi Beta Kappa Graduate Scholarship.

2018 Madeleine F. Clark Wallace Mathematics Prize.

2018 Fred Kollett Prize in Mathematics & Computer Science.

2017 Weaton College Faculty-Student Research Awards

2016 Wheaton Fellows

2014 — 2018 Wheaton College Dean's Lists

Experiences

2021 — Now **Organizer**, *Principle of Programming and Verification Seminar*, Boston University, Boston, MA

2020 — Now **Organizer**, *Programming Language Reading Group*, Boston University, Boston, MA

2019 — Now **Research Assistant**, *Boston University*, Boston, MA

My researches focus on algebraic methods in program analysis. Currently, I am studying various extensions of Kleene Algebra, and how they can be used to model program semantics and logics.

My researches can provide easier proofs for correctness/incorrectness of program, and can also improve automations in program analysis.

2019 — 2021 **Teaching Fellow**, *Boston University*, Boston, MA

I have taught Principle of Programming Language, Introduction to Computer Science, Algebra Algorithm, Geometric Algorithm, etc.

2019 **Grader**, *Boston University CS 511 Formal Method*, Boston, MA

2017 — 2018 **Grader**, *Wheaton College MATH 241 Theory of Probability*, Norton, MA